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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 09/731,945
Filing Date: December 07, 2000
Appellant(s): WALDROP ET AL.

MAILED

SEP 0 8 2005

GROUP 1700

John C. Hammer
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed June 24, 2005 appealing from the Office action mailed January 12, 2005.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is incorrect because the Final rejection was mailed on January 12, 2005.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

4,132,755	JOHNSON	01-1979
5,427,725	WHITE et al.	06-1995
5,129,813	SHEPHERD	07-1992

6,090,335	McCLURE	07-2000
5,364,584	IMANAMARA et al.	11-1994
4,120,632	STOEBERL	10-1978
EP 0 816 438 A2	LEE et al.	01-1997

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

A. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

B. Claims 1 and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US Patent No. 4,132,755) in view of White *et al.* (US Patent No. 5,427,725) and in further view of EP 0 816 438 A2, Shepherd (US Patent No. 5,129,813) and McClure *et al.* (US Patent No. 6,090,335).

Johnson ('755) teaches the basic claimed double vacuum bag process of impregnating with resin a fibrous reinforcement including, providing a mold (1), positioning a fibrous reinforcement preform (2) onto said mold (assembling a perform from suitable reinforcement in a mold), double bagging said reinforcement preform with an inner bag (4) and an outer bag (3), vacuum debulking said assembled preform and infusing resin into said debulked reinforcement perform using a vacuum-assisted resin transfer molding process (see col. 4, line 49 through col. 6, line 50).

Regarding claim 1, although Johnson ('755) teaches an adhesive (col. 8, lines 4-14), Johnson ('755) does not specifically teach tackifying the fiber reinforcement. White *et al.* (725) teach molding a fiber composite including, a first step of partially curing a tackified fiber reinforced composite and a second step of molding said tackified composite by impregnating said fiber reinforced matt with a resin and co-curing the tackifier and the resin to form the composite (see Abstract). It would have been obvious for one of ordinary skill in the art to have first tackified the fiber reinforced preform as taught by White *et al.* ('725) in the double vacuum bag process of Johnson ('755) because, White *et al.* ('725) specifically teach that tackifying provides for net-shape molding of composites by allowing stacking of individual layers in a single operation, which in turn reduces production time, hence increasing productivity.

Further regarding claim 1, Johnson ('755) in view of White *et al.* ('725) do not teach a tackifier containing toughening agents for improved damage tolerances. EP 0 816 438 A2 teaches a fiber reinforced prepreg with superior tack containing particulate elastomers (toughening agent) that improve damage tolerances (see Abstract and col. 2, lines 44-58). Therefore, it would have been obvious for one of ordinary skill in the art to have provided toughening agents as taught by EP 0 816 438 A2 to the tackifier in the double vacuum bag process of Johnson ('755) in view of White *et al.* ('725) because, EP 0 816 438 A2 specifically teaches that such toughening agents provide for improved damage tolerances, hence improving product quality and also because all references teach similar materials and end-products.

Further regarding claim 1, although Johnson ('755) in view of White *et al.* ('725) and in further view of EP 0 816 438 A2 teach a double vacuum bag system, Johnson ('755) in view of White *et al.* ('725) and in further view of EP 0 816 438 A2 do not specifically teach a low

modulus, high elongation nylon vacuum bag that minimizes wrinkling during the molding process. Shepherd ('813) teach a low modulus, high elongation nylon vacuum bag that allows evacuation of air without formation of air pockets and wrinkles (see col. 2, lines 23-27; col. 4, lines 60-65 and, Table 1). Therefore, it would have been obvious for one of ordinary skill in the art to have provided a low modulus, high elongation nylon vacuum bag that minimizes wrinkling as taught by Shepherd ('813) in the process of Johnson ('755) in view of White *et al.* ('725) and in further view of EP 0 816 438 A2 because, Shepherd ('813) specifically teach that such a bag allows for evacuation of air without formation of air pockets and wrinkles, hence providing for an improved molding process and an improved molded product. It is submitted that wrinkles are being minimized during the molding process.

Further regarding claim 1, Johnson ('755) in view of White *et al.* ('725) and in further view of EP 0 816 438 A2 and Shepherd ('813) do not teach a resin flow distribution medium between the inner bag and the fibrous reinforcement. McClure *et al.* ('335) teach a vacuum resin infusion process including, providing a resin flow control medium that forms a screen of open space that tends to wick the resin (fill fibers that act as weirs to the infusing resin) (see col. 1, lines 50-55). It is submitted that the purpose of a resin distribution medium is to control the infusion flow and to create flow resistance because a resin distribution system forms a screen of open space that tends to wick the resin. Further, McClure *et al.* ('335) teach removing said resin flow control medium prior to full curing, hence it is submitted that it is stiff, pliable and chemically inert. Therefore, it would have been obvious for one of ordinary skill in the art to have provided a resin flow control medium as taught by McClure *et al.* ('335) in the process of Johnson ('755) in view of White *et al.* ('725) and in further view of EP 0 816 438 A2 and

Shepherd ('813) because, McClure *et al.* ('335) specifically teach that a resin flow control medium creates a uniform and homogeneous resin flow, hence improving product quality. It is submitted that because the resin flow is uniform and homogeneous that markoff on the side of the vacuum bag in the process of Johnson ('755) in view of White *et al.* ('725) and in further view of EP 0 816 438 A2 and Shepherd ('813) is eliminated. Further, it should be noted that the exposure temperature of the resin flow control medium is dependent on the type of resin being infused. It is submitted that the resin flow control medium in the process of Johnson ('755) in view of White *et al.* ('725) and in further view of EP 0 816 438 A2, Shepherd ('813) and McClure *et al.* ('335) can withstand a temperature of up to about 600 °F because the resin used requires such curing temperatures.

Further regarding claim 1, although Johnson ('755) in view of White *et al.* ('725) and in further view of EP 0 816 438 A2 and Shepherd ('813) teaches a vacuum port, Johnson ('755) in view of White *et al.* ('725) and in further view of EP 0 816 438 A2 and Shepherd ('813) do not teach multiple vacuum ports. However, the use of multiple vacuum ports is well known. Further, it is noted that under MPEP §2144(VI)(B), the "mere duplication of parts has no patentable significance unless a new and unexpected result is produced." Hence, it would have been obvious for one of ordinary skill in the art to have provided multiple vacuum ports in the process of Johnson ('755) in view of White *et al.* ('725) and in further view of EP 0 816 438 A2 and Shepherd ('813) because it reduces processing time, hence improving productivity.

In regard to claim 6, White *et al.* (725) teach a two-step molding process. Specifically, White *et al.* (725) teach that in the first step, the fiber reinforced matt is tackified at an elevated temperature of about 40 to 100 degrees C. In the second step, the heated tackified fiber

reinforced matt is impregnated with resin in a mold to form a composite. Therefore, it would have been obvious for one of ordinary skill in the art to have first heated the fiber reinforced matt as taught by White *et al.* ('725) and then impregnated the heated tackified fiber reinforced matt under vacuum in the process of Johnson ('755) in view of EP 0 816 438 A2 and in further view of Shepherd ('813) and McClure *et al.* ('335) because, White *et al.* ('725) specifically teach that tackifying provides for net-shape molding of composites by allowing stacking of individual layers in a single operation, which in turn reduces production time, hence increasing productivity.

Specifically regarding claim 7, White *et al.* (725) teach a first step of partially curing a tackified fiber reinforced composite at a temperature of about 40 to 100 degrees C. In the second step, the heated tackified fiber reinforced matt is impregnated with resin in a mold to form a composite. Further, Johnson ('755) teach infusing resin into a debulked reinforcement perform using a vacuum-assisted resin transfer molding process. Therefore, it would have been obvious for one of ordinary skill in the art to have first heated the fiber reinforced matt as taught by White *et al.* ('725) and then debulked and impregnated the heated tackified fiber reinforced matt under vacuum in the process of Johnson ('755) because, White *et al.* ('725) specifically teach that tackifying provides for net-shape molding of composites by allowing stacking of individual layers in a single operation, which in turn reduces production time, hence increasing productivity.

Regarding claim 8, White *et al.* (725) teach that glass and carbon fibers are equivalent alternatives (see col. 2, lines 50-53). Further, White *et al.* (725) teach an epoxy resin and an epoxy resin tackifier (col. 4, lines 55-56). It would have been obvious for one of ordinary skill in

the art to have used a carbon fiber, an epoxy resin and an epoxy tackifier to tackify the carbon fiber reinforced preform as taught by White *et al.* ('725) in the process of Johnson ('755) in view of EP 0 816 438 A2 and in further view of Shepherd ('813) and McClure *et al.* ('335) because, White *et al.* ('725) specifically teach that tackifying provides for net-shape molding of composites by allowing stacking of individual layers in a single operation, which in turn reduces production time, hence increasing productivity and also because, White *et al.* ('725) teach that carbon fibers and glass fibers are equivalent alternatives and, all references teach similar materials and end-products.

C. Claims 4-5 and 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US Patent No. 4,132,755) in view of White *et al.* (US Patent No. 5,427,725) and in further view of EP 0 816 438 A2, Shepherd (US Patent No. 5,129,813), McClure *et al.* (US Patent No. 6,090,335) and Imanara *et al.* (US Patent No. 5,364,584).

Johnson ('755) in view of White *et al.* ('725) and in further view of EP 0 816 438 A2, Shepherd ('813) and McClure *et al.* ('335) teach the basic claimed process as described above.

Regarding claims 4-5, Johnson ('755) in view of White *et al.* ('725) and in further view of EP 0 816 438 A2, Shepherd ('813) and McClure *et al.* ('335) do not teach an infusion direction that is tilted at an angle from the horizontal. Imanara *et al.* ('584) teach a molding process of a fiber reinforced matt including tilting the mold at an angle (see Figure 1). It would have been obvious for one of ordinary skill in the art to have tilted that mold assembly as taught by Imanara *et al.* ('584) in the process of Johnson ('755) in view of White *et al.* ('725) and in further view of EP 0 816 438 A2, Shepherd ('813) and McClure *et al.* ('335) because, Imanara *et al.* ('584)

specifically teach that tilting reduces the amount of voids in the final molded article, hence improving resin impregnation and product quality (see col. 4, lines 55-65).

Further in regard to claim 5, and regarding claim 10, Imanara *et al.* ('584) teach that injection of resin occurs at a lower portion such that resin flows upwardly, hence against gravitation. Therefore, it would have been obvious for one of ordinary skill in the art to have injected resin at a lower portion of a mold such that resin flows against gravitation as taught by Imanara *et al.* ('584) in the process of Johnson ('755) in view of White *et al.* ('725) and in further view of EP 0 816 438 A2, Shepherd ('813) and McClure *et al.* ('335) because, Imanara *et al.* ('584) specifically teach that tilting and injecting resin against gravitation reduces the amount of voids in the final molded article, hence improving resin impregnation and product quality (see col. 4, lines 55-65).

D. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US Patent No. 4,132,755) in view of White *et al.* (US Patent No. 5,427,725) and in further view of EP 0 816 438 A2, Shepherd (US Patent No. 5,129,813), McClure *et al.* (US Patent No. 6,090,335) and Stoeberl (US Patent No. 4,120,632).

Johnson ('755) in view of White *et al.* ('725) and in further view of EP 0 816 438 A2, Shepherd ('813) and McClure *et al.* ('335) teach the basic claimed process as described above.

Regarding claim 11, Johnson ('755) in view of White *et al.* ('725) and in further view of EP 0 816 438 A2, Shepherd ('813) and McClure *et al.* ('335) do not teach throttling the vacuum lines. Stoeberl ('132) teaches a vacuum molding process in which a resin is infused into a preform position in a mold cavity (see Figures 3c and 2b). Further, Stoeberl ('132) teaches the idea of throttling vacuum line (13) in order to provide uniform distribution of resin (9)

throughout the fiber reinforcement (1) (see col. 4, lines 35-50). It is submitted that the uniform distribution of resin in Stoeberl ('132) by throttling the vacuum line results in equal mass flow rate of resin throughout the preform and the vacuum line. Therefore, it would have been obvious for one of ordinary skill in the art to have throttled vacuum lines as taught by Stoeberl ('132) in the process of Johnson ('755) in view of White *et al.* ('725) and in further view of EP 0 816 438 A2, Shepherd ('813) and McClure *et al.* ('335) because, Stoeberl ('132) specifically teaches that throttling of a vacuum line provides uniform resin distribution throughout the fiber reinforcement and reduces porosity by allowing air to escape, hence improving product quality.

E. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US Patent No. 4,132,755) in view of Stoeberl (US Patent No. 4,120,632).

Johnson ('755) teaches the basic claimed double vacuum bag process of impregnating with resin a fibrous reinforcement including, providing a mold (1), positioning a fibrous reinforcement preform (2) onto said mold (assembling a perform from suitable reinforcement in a mold), double bagging said reinforcement preform with an inner bag (4) and an outer bag (3), vacuum debulking said assembled preform and infusing resin into said debulked reinforcement perform using a vacuum-assisted resin transfer molding process (see col. 4, line 49 through col. 6, line 50).

Regarding claim 12, Johnson ('755) does not teach throttling the vacuum lines. Stoeberl ('132) teaches a vacuum molding process in which a resin is infused into a preform position in a mold cavity (see Figures 3c and 2b). Further, Stoeberl ('132) teaches the idea of throttling vacuum line (13) in order to provide uniform distribution of resin (9) throughout the fiber reinforcement (1) (see col. 4, lines 35-50). It is submitted that the uniform distribution of resin in Stoeberl ('132)

by throttling the vacuum line results in equal mass flow rate of resin throughout the preform and the vacuum line. Therefore, it would have been obvious for one of ordinary skill in the art to have throttled vacuum lines as taught by Stoeberl ('132) in the process of Johnson ('755) because, Stoeberl ('132) specifically teaches that throttling of a vacuum line provides uniform resin distribution throughout the fiber reinforcement and reduces porosity by allowing air to escape, hence improving product quality.

(10) Response to Argument

In response to Appellants' argument that the examiner has combined an excessive number of references, reliance on a large number of references in a rejection does not, without more, weigh against the obviousness of the claimed invention. See *In re Gorman*, 933 F.2d 982, 18 USPQ2d 1885 (Fed. Cir. 1991).

In response to Appellants' arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Appellants argue that because "White fails to teach that tackifying can or should be used in a vacuum-assisted resin infusion process...no one would combine Johnson and White in the manner that the Examiner has" (see page 8 of the Appeal Brief filed 6/24/2005). In response, it is noted that Johnson ('755) teaches a double vacuum bag process of impregnating with resin a fibrous reinforcement, whereas White *et al.* (725) teach molding a fiber composite including, a first step of partially curing a tackified fiber reinforced composite and a second step of molding said tackified composite by impregnating said fiber reinforced matt with a resin and co-curing

the tackifier and the resin to form the composite (see Abstract). It is noted that under MPEP §2141.02, the "prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention." W.L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983). Hence, it would have been obvious for one of ordinary skill in the art to have first tackified the fiber reinforced preform as taught by White *et al.* ('725) in the double vacuum bag process of Johnson ('755) because, White *et al.* ('725) specifically teach that tackifying provides for net-shape molding of composites by allowing stacking of individual layers in a single operation, which in turn reduces production time, hence increasing productivity.

Appellants argue that "White fails to teach or to suggest...a tackifier that toughens the composite to improve its damage tolerance" (see page 8 of the Appeal Brief filed 6/24/2005). In response, it is noted that under MPEP §2144, "[T]he rationale to modify or combine the prior art does not have to be expressly stated in the prior art; the rationale may be expressly or impliedly contained in the prior art or it may be reasoned from knowledge generally available to one of ordinary skill in the art, established scientific principles, or legal precedent established by prior case law. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

Appellants argue that "[I]t is illogical...to use McClure's flow media with Johnson's system insofar as going so provides two elements to perform the same function when either one would do fine along" (see page 10 of Appeal Brief filed 6/24/2005). In response, it is noted that McClure *et al.* ('335) teach a vacuum resin infusion process including, providing a resin flow control medium that forms a screen of open space that tends to wick the resin (fill fibers that act as weirs to the infusing resin) (see col. 1, lines 50-55). It is submitted that the purpose of a resin

distribution medium is to control the infusion flow and to create flow resistance because a resin distribution system forms a screen of open space that tends to wick the resin. Therefore, it would have been obvious for one of ordinary skill in the art to have provided a resin flow control medium as taught by McClure *et al.* ('335) in the process of Johnson ('755) in view of White *et al.* ('725) and in further view of EP 0 816 438 A2 and Shepherd ('813) because, McClure *et al.* ('335) specifically teach that a resin flow control medium creates a uniform and homogeneous resin flow, hence improving product quality. Hence, it is submitted that the resin distribution medium of McClure *et al.* ('335) be used in the process of Johnson ('755) in view of White *et al.* ('725) and in further view of EP 0 816 438 A2 and Shepherd ('813) as an improvement and not as an additional component as Appellants suggest.

Appellants argue that the "White does not suggest...that the inner vacuum bag is applied when the preform is at an elevated temperature" (see page 11 of the Appeal Brief filed 6/24/2005). However, as shown throughout prosecution of the instant application, White *et al.* teach that in the first step, the fiber reinforced matt is tackified at an elevated temperature of about 40 to 100 degrees C. In the second step, the heated tackified fiber reinforced matt is impregnated with resin in a mold to form a composite. Hence, it is submitted that if the heated tackified reinforced matt is placed in a mold as taught by White *et al.* ('725) in the process of Johnson ('755) in view of EP 0 816 438 A2 and in further view of Shepherd ('813) and McClure *et al.* ('335), then the vacuum bags are applied at an elevated temperature, at least the temperature of the heated tackified reinforced matt. Therefore, it would have been obvious for one of ordinary skill in the art to have first heated the fiber reinforced matt as taught by White *et al.* ('725) and then impregnated the heated tackified fiber reinforced matt under vacuum in the

process of Johnson ('755) in view of EP 0 816 438 A2 and in further view of Shepherd ('813) and McClure *et al.* ('335) because, White *et al.* ('725) specifically teach that tackifying provides for net-shape molding of composites by allowing stacking of individual layers in a single operation, which in turn reduces production time, hence increasing productivity. It is noted that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Appellants argue that "Stoerberl does not discuss equilibrating the mass flow rate into the cavity with that in the preform" (see page 12 of the Appeal Brief filed 6/24/2005). In response, it is noted that under MPEP §2144.01, "it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom." In re Preda, 401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA 1968). Hence, Stoeberl ('132) teaches a vacuum molding process in which a resin is infused into a preform position in a mold cavity (see Figures 3c and 2b). Further, Stoeberl ('132) teaches the idea of throttling vacuum line (13) in order to provide uniform distribution of resin (9) throughout the fiber reinforcement (1) (see col. 4, lines 35-50). It is submitted that the uniform distribution of resin in Stoeberl ('132) by throttling the vacuum line results in equal mass flow rate of resin throughout the preform and the vacuum line because otherwise the resin distribution would not be uniform. Specifically if more air exists then the flow is stopped, whereas if less air exists then the resin overflows and pools, thereby resulting in a poor quality molded product.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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